JOURNAL
OF THE
BOMBAY NATURAL
HISTORY SOCIETY

1963 AUGUST Vol. 60 No. 2

The Biology of the Eastern Spanish Sparrow, *Passer hispaniolensis transcaspicus* Tschusi, in Kazakhstan[1]

BY

E. I. GAVRILOV

Institute of Plant Protection, Alma-Ata, U.S.S.R.

(*With three plates*)

The study of the bionomics of different species of birds has not received sufficient attention till recently. This is true not only about rare birds, but also about common ones which have a world-wide distribution. For example ornithologists have so far paid very little attention to the sparrows, although some species of sparrows have a very important economic significance. For a long time in central Asia and in south Kazakhstan they have been serious pests to the farmers. But apart from this some of them are very sociable birds and it is especially interesting to study their communal life.

During three years the author studied the biology of sparrows. He tried out the earlier methods of controlling their numbers and tested new methods. This work was performed under the guidance of Professor I. A. Dolgushin, Doctor of Biological Sciences.

The Eastern Spanish Sparrow, *Passer hispaniolensis transcaspicus* Tschusi, is the most numerous among our sparrows. It is distributed in Kazakhstan from the administrative frontier at the south, northward as far as the valleys of the rivers Sir-Daria and Chu. It is also found

[1] Communicated by Dr. Sálim Ali.

in the lowlands adjoining the Kirgizsky, Zailyisky, and Dzungarsky Ala-Tau, north to Lake Alakoul.

The observations of the last few years show that this species is rapidly colonizing new areas. In the first forty years of this century the north-eastern boundary of its range lay along the river Karatal and in the valley of Ili river near the town of Panfilov (Shnitnikov, 1949). Development of extensive forest plantations and agriculture since then has provided the sparrow with excellent living conditions. Taking advantage of these the bird has spread right up to Lake Alakoul where it was found in 1959.

Simultaneously with the extension of its range, the Eastern Spanish Sparrow increased in numbers. According to the observations of I. A. Dolgushin (personal information) the bird was not found near the village Ilyisk in 1931, 1932, and 1933. The first birds were obtained by him there in 1934, and they were then considered to be extremely rare in this region. But already by 1949-50 the Spanish Sparrows had become the most numerous among the sparrows in this place.

Meanwhile the numbers of the Indian Sparrow (*Passer domesticus bactrianus* Zar. et Kudasch.)[1] dropped. Apparently, the Spanish Sparrow, being larger, more aggressive, and more communal, forced the Indian Sparrow out from the forest plantations. The latter has now taken to nesting in villages, and in holes in precipices, etc.

The Spanish Sparrow nests almost exclusively in cultivated areas, living in the proximity of man. The availability of grain crops is one of the necessary conditions for these birds, and they seldom nest at any distance from cultivation. However, Spanish Sparrows usually nest away from actual human settlements, and only occasionally within villages and the outskirts of small towns. But the bird readily follows in the wake of cultivation, and has reached 500 to 600 m. above sea-level in the Zailyisky Ala-Tau mountains, and in places even up to 1370 m.

It is a migratory bird. Its winter range chiefly comprises northern Africa, Palestine, Iraq, Iran, Baluchistan, north-western India, and Sintzian. In the Soviet Union it winters in large numbers in Turkmenia. It may also be found in winter in Tadjikistan, Kirgizia, along the northern outskirts of the Kisil-Kum desert, in the valley of the river Sir-Daria. In winter 1954-55 it was observed in small numbers in the delta of the river Ili (Gratchev, 1960).

[1] Considered by some authors to be synonymous with both *parkini* and *griseigularis*; by others to be separable from *parkini*.—S. A.

The birds probably start the return flight from their winter quarters about the beginning of March, as the spring migration takes place in northern India from the second week of March to the middle of April (Whitehead, 1909). They come to Kazakhstan at the end of April, or in May. Their mass arrival is observed, usually, in the middle or end of May.

During their migration the birds keep mainly to open biotope, preferring areas with bushes, especially thorny ones, which are favourite places of rest for all sparrows. They fly in flocks of 5-10 to 150-300 individuals, which consist, as a rule, exclusively of birds of their own species, only rarely mixed with a few Indian Sparrows. It is typical of the flocks to fly along open highways if running in the proper direction. The spring passage occupies a long overall period. In 1959, near the village Nikolaevka, the sparrows were flying in from the end of April till the first days of June. The first to arrive are the males, beginning with a few individuals and then in small flocks. Later, at the period of mass flight, the flocks of males contain a small number of females; while in the last flocks the females predominate.

The Spanish Sparrow nests as a rule in large colonies. Commonly the colonies are of 20-30 thousand nests, and sometimes they consist of 100 thousand or even 800 thousand nests. The smaller colonies of sparrows are found mainly in the north-eastern region of its range. For example, in the Alma-Atinsky region in 1959 along the river Karatal and near the village Uch-Aral their colonies consisted of 200-5000 nests (average 1700) and near the villages Ilyisk and Chilik of 500-25,000 nests (average 10,000). In 1961, in the neighbourhood of the villages Chokpar and Krasnogorka they consisted of 7500-90,000 nests (average 31,000); in 1962 in the Kurdaisky district of the Djambul region, of 300-800,000 nests (average 42,500). One hectare of forest plantation contained an average of about 13,000 nests.

We observed two types of sparrow colonies. The first type is situated in gardens, groves, and small forest plantations, within a distance of a few hundred metres. Such places are usually settled by the sparrows in 1-2 days. The colonies of the second type are situated in forest plantations stretching very often over several kilometres. Here, side by side with areas of dense settlement, are areas with a small sparse settlement or completely unoccupied. In such colonies, the sparrows first build in the central parts, which still have many of the last year's nests, and it is only afterwards that they occupy the outer areas with fewer nests.

During the establishment of a colony, incoming flocks give first preference to trees already occupied by other sparrows. If all the suitable places are occupied, the newcomers are forced out by the males guarding their territories. The birds have then to resort to neighbouring trees with either very few nests or none at all. Thus in the well-established colonies the number of nests on each tree remains more or less constant from year to year.

It is interesting to note that wherever there is room for two or more nests the males may sit side by side to attract the females. If in the forked crown there is room for only one nest, the 'owner' forces out each intruder.

In contrast with many colonial birds which return for breeding to the same place year after year, the Spanish Sparrows prove not to be constant to particular nesting sites. Often without apparent reason the birds will not settle in the forest plantations where they nested during previous years, and will organize their colonies in new places. This might be explained by the change in the number of sparrows and by their attempt to occupy a more suitable area from the beginning. In any region they always settle first in forest plantations, which are the most convenient for them, and afterwards, as their number increases, they occupy other places less suitable for reproduction. On the other hand the primarily settled places may be deserted.

By means of ringing it was found that in 1961 among the sparrows near the village of Chokpar only 11% of the birds were 'local', i.e. bred here in the previous year, while 89% of the birds were 'new arrivals' from some other regions. In 1962 in the same region these figures were changed to 5 and 95% respectively (in 1961 and 1962 there was mass extermination of the sparrows here).

The data obtained by us confirmed the wide exchange of birds between different populations. This circumstance may be responsible for the intensive settling of the Spanish Sparrows in new places. It may also explain the extremely weak development of nest-conservatism and the lack of constancy to their nesting places.

The establishment of the Spanish Sparrow colonies usually happens a few days after the beginning of the mass arrivals, and even in the same region the colonies are not occupied simultaneously. The first to be occupied are those mixed colonies which are situated in the neighbourhood of villages, in which there are a considerable number of House Sparrows as well as Spanish Sparrows. House Sparrows uttering their mating-call may already be observed here by the middle

1. A male (with grass blade) and his hen

2. A displaying male

(*Photos : E. Gavrilov*)

3. A completed nest (side view)

4. Early stage of nest : a ball-shaped openwork structure

(*Photos : E .Gavrilov*)

of April. Probably this attracts the Spanish Sparrows, which first begin establishing their colonies in such areas.

Some colonies which consist exclusively of Spanish Sparrows start establishing 7-28 days later, when the first-settled birds have already hatched their chicks.

The Spanish Sparrow nests in Kazakhstan in different forest plantations (Fig. 5 and 6). It is a marked fact that the birds gravitate towards that species of tree, the branching of which facilitates nest construction. The sparrows' nests are situated in the greatest density on Lombardy Poplars (more than one hundred on a single tree), then to a diminishing degree on Oleasters (*Elaegnus angustifolia* L.), False Acacias (*Robinia pseudoacacia* L.), Ashenleaf Maples (*Acer negundo* L.), other poplars, and Cork Elm (*Ulmus campestris* L.). They also make their nests on fruit trees, and in exceptional cases even on Huntingdon Willows.

Depending on the character of the branching of the trees, the nests may be situated alone, or one below another like a garland, or they may be built surrounding a stem. There may be anything from 1-5 to 120-130 nests on one tree. The height of the nest depends as a rule on the species and age of the tree. In young forest plantations they were found at a height of 50 cm. on Oleaster, whereas on Lombardy Poplars the nests may be built at the top, about 25-30 m. high.

The vanguard of males usually occupy last year's nests or even older ones which are sometimes merely semi-putrefied heaps of grass. Occasionally, but not often, the birds choose some forked crown, where they bring ten or more blades of grass to make the apron.

After choosing the site for his future nest the male, by means of a strenuous twittering, begins to attract a female (Fig. 2). The twittering of thousands of sparrows makes such a deafening noise that it is often difficult to converse in a colony.

When the females fly in they carefully observe the sites for the nests, but pay little attention to the males uttering their mating-call with so much enthusiasm. Later, each female chooses one of them. After pair formation the male begins the intensive repair of an old nest or works on a new one. He does the main work, bringing the building material and laying it in its place. At this period the female helps very little, but later she lines the nest herself.

The nest is made exclusively of green grass, which is collected by the birds themselves (Fig. 1). They use a lot of mown grass. At some places where a field of lucerne, which is first cut in May, is

situated near a colony of sparrows, the birds bring in many tons of the newly cut grass. Often it was observed that the males made attempts to steal one another's material for their own nests. The nest is lined with small pieces of wormwood, with leaves of acacia, and so on, and only occasionally with a few feathers. This is the sign by which Spanish Sparrows' nests may be differentiated from those of House, Indian, and Tree Sparrows which always have a large amount of feather lining.

The building of the nest is carried out in the following way: at first the apron is made from the stems of grasses and thin branches, then the walls and the roof are built from the same material. At the end of the second day the nest has the appearance of a ball-shaped openwork structure (Fig. 4). At the time of egg-laying the nest looks like a globe with thick walls and a lateral entrance. During the period of egg-laying, and in the first days of incubation, the male prolongs his activity by making the lateral tubular entrance—the antechamber of the nest.

Where the lack of branches does not allow it to make the openwork foundation of the nest, or if the bird uses the cut lucerne as building material, the nest is made in another manner. After building the apron of the nest the sparrow begins to build its thick walls, leaving a place for the lateral entrance. Thereafter it makes the roof, and last of all the antechamber. The finished nest represents a ball-shaped or oval structure with a diameter of 20-30 cm., with a lateral entrance which projects like a small tube (Fig. 3). The weight of the nests is from 70 to 300 gm. (average 150).

The building of the nest takes 4 or 5 to 7 days (Achmetov, 1953; Umrichina, 1955). The sparrows that come later complete their nests in a shorter time than those that arrive and start earlier.

The sparrows begin laying before the building of the nest is completed. This may be especially observed in colonies which are rather late in settling. The females come here with well-developed gonads and the first eggs may be laid during the flight, while on passage to their nesting place. Every morning the female lays one egg. As may be seen from Table I, the full complement is of 2-7 eggs, but usually 4-5 eggs, with an average of 4.4. The egg measurements, taken with a vernier calliper, are given in Table II.

Abnormal (pigmy) eggs, lacking the yolk, were found twice. One of them measured 11.6×10.6 mm. and weighed 0.67 gr. It was the first of the clutch, the other five eggs of the same female being normal.

The number of the laid eggs in some birds, for example in the

5. Part of sparrow nest colony in roadside forest belt

6. Part of sparrow nest colony in garden protecting forest belt

(*Photos : E. Gavrilov*)

Starling (*Sturnus vulgaris* L.), does not correspond to the ova ovulated (Davis, 1958). We examined the state of the ovaries of 19 Spanish

TABLE I

CLUTCH-SIZE OF THE SPANISH SPARROW
(according to the data obtained in 1959-61)

Number of eggs	2	3	4	5	6	7	Total nests examined
No. of nests in which found ..	22	124	399	493	59	2	1099
% of nests examined..	2.0	11.3	36.3	44.8	5.4	0.2	100%

TABLE II

EGG MEASUREMENTS OF THE SPANISH SPARROW

	Min.	Max.	Mean with standard deviation	Quadratic deviation	Number measured
Length in mm. ..	18.0	25.7	21.93 ± 0.0712	± 1.1111	244
Width in mm. ..	13.7	16.6	15.29 ± 0.0346	± 0.5395	244
Shape width/length..	0.55	0.81	0·70 ± 0.0032	± 0.0505	244
Weight in gr. ..	1.62	3.47	2.63 ± 0.0156	± 0.2460	248

Sparrows and the contents of their nests. It was found that only 4 females had the same number of eggs in the nest as the ovulated ova, and the clutches of the others were 1, 2, 3, 4, and 5 less than the broken follicles. The latter two cases represented an exact replacement of the first clutch by a second one; in the other cases the extra eggs laid were probably lost.

In some species of birds there is possibility of producing more eggs than is typical for the species (indeterminate laying). A. E. Brehm (1911) cites the observations of Rey, who took one egg from nests of House Sparrows every day and in such circumstances the females laid up to 49 eggs in succession. The same experiment was performed by us on 11 females of the Spanish Sparrow. After the first egg was laid, every time another egg was laid one of the two eggs was removed so that there was always only one egg left in the nest. It became clear that this species is a determinate layer and

that the number of eggs could not be increased in this manner. Each of the 11 birds laid 3-6 eggs (average 4.5) and then stopped. By examining 172 nests in this colony it was ascertained that the average clutch-size of Spanish Sparrows was about 4.5 eggs.

The egg-laying in a colony is usually completed within a short period. In three colonies, when only the Spanish Sparrows were nesting, by the 5th day after the appearance of the first egg in the nests, 75, 80, and 89% of all the birds began their laying. In this case nestlings also developed rapidly and the colonies very soon became disinhabited, more or less synchronously.

Many authors have stated that the same colony of sparrows may contain nestlings of different ages and eggs at different stages of incubation. Our material confirms this; this condition is usually observed in mixed colonies where different species of sparrows, including House Sparrows, which have several broods in a year, nest together. Thus such colonies have nesting sparrows during the whole summer. If the Spanish Sparrows lose the first clutch for some reason, or if any one of the parents dies, the birds join these mixed colonies for reproduction. Besides, some of the birds normally nest twice a year.

In the incubation, which starts after the second egg is laid, both parents take part, although the female's is the major share. At night only females have been found on the nests. The males gather in large flocks at night and roost in leafy trees, often at a considerable distance from their nests.

After an incubation period of 11-14 days the blind naked nestlings are hatched. Both parents bring them up. While catching the sparrows at night we made an interesting observation. It was found that the female parent, which was frightened off her nest, returned after some time in spite of the total darkness. One female returned to the nestlings twice, and it was possible to catch her only at the third attempt.

It is quite obvious that the sparrows cannot orientate themselves well in darkness. When the birds were released after the ringing they fell down and it was only after some time that they could fly up[1]. On reaching the tops of the trees they alighted on the first

[1] From similar experience with Spanish Sparrows during the BNHS/WHO bird ringing field camps in Rajasthan, it is suggested that this seeming helplessness in the dark may be due only to the birds becoming temporarily blinded by the bright electric light under which the ringing was done. The birds at first used to flop to the ground immediately on being released but, later, when set down gently on a platform away from the light, they soon recovered their sight and flew off strongly into the darkness.—S.A.

branch. It is possible that in locating their nests at night the sparrows orientate themselves by means of the 'muscle feeling', [echo-location ?], based on the filmostatic memory, in the same way as Oilbirds (*Steatornis*) and *Collocalia* swiftlets nesting in dark caves, which unerringly find their own nests from among numerous others (Dementiev, 1940).

Ordinarily 1-2 of the younger nestlings, who are behind the others in growth, perish. On an average 2-3 nestlings fly from each nest. The chicks leave the nest after 11-12 days.

As already mentioned, the egg-laying in many colonies is performed rapidly and synchronously. In consequence of this all other stages of breeding, including hatching and flying of young from the nests, are also synchronized. It is interesting that each of the three stages—egg-laying, incubation, and the nestling period —covers a period of about 9×24 hours.

After their first flight from the nest the fledglings live in the colony where they are fed by the parents. At night they usually fly to their nests, sometimes to another's, where there are other chicks too. Some of the fledglings spend the night on trees with the adults.

After becoming fully fledged, the young leave the colony, bunch into flocks consisting sometimes of a few thousand birds, and start the migratory life. All the time the flocks are augmented by young ones from later broods. Sometimes these flocks are joined by juveniles with imperfectly developed flight feathers and still dependent on the parents for food. The absence of adult birds in these flocks, except for the few individuals that are tending such immature juveniles, is characteristic. About one month after leaving the nests the young sparrows begin to shed the first feathers and gradually moult into adult plumage.

It was observed that in the juveniles of the Spanish Sparrow before the moult, when the sex of the birds cannot be determined superficially, or just at commencement of the post-juvenile moult, the flocks tend to split up sex-wise. In 1961 on July 4-9 from each of 26 flocks near the village Chokpar 5-11 birds were collected. In 13 flocks, males predominated (91% of 105 sparrows), and in the other 13 flocks, females (90% of 98 sparrows). Only males were obtained from 6 flocks of which 48 birds were collected; and only females from 4 flocks of which 31 birds were collected. It is in such sex-segregated flocks that the sparrows apparently spend the time left till their departure in autumn, and also during migration.

In this interval the adult sparrows either re-nest or raise second

broods, or gather in flocks and in the middle of June or in July are flying for the moult. Probably for the completion of the post-nuptial moult the birds gather in some other region, since all adult sparrows obtained by us in August were only just beginning the moult, and in spite of careful searching none were found in subsequent stages of moult in this region.

Only a few of the sparrows which are the first to arrive, at the beginning of May, nest twice a year; the rest only breed once. The possibility of re-nesting keeps all birds there rather a long time. And in case of accidents, either to the clutch or the nestlings, they readily breed again. Thus it is that the destruction of nests alone has little effect in the campaign for reducing sparrow numbers.

During the autumn migrations the birds confine themselves to corn fields and thickets of weeds. They are partial to the fields of late ripening millet and hemp, where they collect in masses causing great damage to the crops.

The departure of adult Spanish Sparrows from Alma-Atinskaya and Dzambulskaya regions takes place immediately after breeding is over. In 1961 the passage near the village Chokpar was observed from June 13th on, and it became especially intensive at the beginning of July. Young birds leave considerably later than the adults, and probably all the late meetings with the Spanish Sparrow in Kazakhstan concern young birds. Normally they emigrate in September-October; a few stray birds stay behind up to the middle of November.

Fecundity. It is well known that not all laid eggs are fertile. The number of infertile eggs in the clutches of the Spanish Sparrow is not large. In 1959-1961 such eggs were found in 95 (17.6%) out of 537 nests examined, and represented 4.9% of the total number of eggs. The loss of embryos during the incubation period is also not heavy. In 1959-1961 dead embryos were found in 23 (4.2%) out of the 537 nests inspected, and represented 1.2% of the total number of eggs. Thus the joint loss from both these causes during 3 years was 6.1% of the total number of eggs. Observation at 75 nests in 1960 showed that 95.1% of the eggs hatched.

But the loss of nestlings in Spanish Sparrows is considerable. It is only in a few cases that all the nestlings leave the nest as fledglings. Ordinarily 1-2 of the younger and weaker nestlings die.

The number of chicks which reach the flying stage is in direct ratio to the clutch-size: as more eggs are laid so, on the average, more fledglings leave the nest (Table III).

TABLE III

NUMBER OF NESTLINGS THAT FLEW IN RELATION TO CLUTCH-SIZE
(In the colony near the village Chokpar, 1960)

Clutch-size	No. of young that flew					Average for one nest
	1	2	3	4	5	
2 ..	1	1	—	—	—	1.5
3 ..	—	2	—	—	—	2.0
4 ..	3	9	7	7	—	2.69
5 ..	6	17	15	17	—	2.78
6 ..	—	2	2	2	1	3.3
Total of data ..	10	31	24	26	1	92 \ 2.77

The loss of nestlings is higher in the larger clutches. If in the clutch of 2 eggs an average of 75% reach the flying stage, so in the clutch of 3 eggs—66%, of 4 eggs—67%, of 5 eggs—55% and of 6 eggs—54%. According to the observations at the 290 nests in 1959-1961 the average number of Spanish Sparrow nestlings which left the nest was 2.54 per breeding pair of adult birds.

In 1960, in the colony near the village Chokpar, there were 100 nests the building of which had just begun. They were examined regularly every second day. The results are contained in Table IV.

TABLE IV

NESTING SUCCESS OF THE SPANISH SPARROW

Fate of nests	No. of cases
1. Nest deserted before egg-laying began ..	11
2. Nest deserted before egg-laying finished ..	6
3. Nest deserted after egg-laying finished ..	8
4. Nest with eggs fell off tree ..	2
5. Nest destroyed (by man?) ..	18
6. All nestlings died ..	4
7. Nestlings flew successfully ..	51
Total of data ..	100

In July of the same year, in the colony near the village Nikolaevka, 66 nests were inspected. 2 of them (3.1%) were unfinished, 3 (4.5%) were deserted before the egg-laying, 6 (9.1%) were deserted with clutches, 3 (4.5%) contained dead nestlings, and 52 (78.8%) live nestlings. So, as a result of unequal sex-ratio[1], of death of either one or both parents, of the destruction of nests by predators, or for some other reason, only 50-80% of nests are usually saved.

There are contradictory data as regards the number of broods in a year. Some workers consider that Spanish Sparrows nest only once in a season (Kashkarov *et al.*, 1926; Achmetov, 1953; Stegman, 1956a, b), while others think that there are two broods in a season (Brehm, 1911; Sudilovskaya, 1954; Umrichina, 1955).

The study of the gonads of these birds at the different stages of the reproductive cycle showed that the gonads of the males and females during the incubation and feeding of nestlings decreased only very slightly (Table V). This confirms their ability to resume the laying at any stage of the reproductive cycle. As stated above, some of the sparrows have normally two broods in a year. The birds that started their nesting early in the season—at the beginning or middle of May—had two full complements. The late comers, who occupied the colonies at the end of May or in June, raised only one brood.

TABLE V

CHANGE OF GONAD-SIZE IN THE SPANISH SPARROW AT DIFFERENT STAGES OF THE REPRODUCTIVE CYCLE

Sex	Measured gonads	Years	Stages of reproduction		
			Egg-laying	Incubation	Feeding of nestlings
♂♂	Testes (average length in mm.)	1959	9.1 (8)[2]	9.0 (21)	9.3 (11)
		1960	—	9.1 (25)	8.7 (25)
♀♀	Ovaries (average length, width, diameter of the largest follicle in mm.)	1959	12.3 × 8.4 d = 7.6 (9)	8.2 × 4.9 d = 1.9 (19)	7.8 × 4.8 d = 1.6 (10)
		1960	—	8.7 × 5.4 d = 2.0 (21)	6.9 × 4.1 d = 1.5 (44)

[1] Unfinished nests are the product of the surplus males. The birds apparently failed to attract females, so deserted the nests and probably left the colony.

[2] Number of birds studied in brackets.

It is quite possible that the number of clutches of the Spanish Sparrow depends on the presence of favourable conditions for breeding, and potentially all adult sparrows may apparently hatch their broods several times in a year.

The fecundity of the Spanish Sparrow in different years is variable, as may be seen in Table VI.

TABLE VI

FECUNDITY OF THE SPANISH SPARROW IN DIFFERENT YEARS

	1959	1960	1961
Clutch-size ..	4.37	4.51	4.48
Nests with unfertilized eggs in % ..	14.8	11.3	26.2
Number of unfertilized eggs in % ..	4.3	2.4	7.4
Nests with dead embryos in % ..	2.5	7.2	5.4
Number of dead embryos in % ..	0.8	1.7	1.3
Number of hatched nestlings in each nest (average) ..	4.0	4.4	3.8
Number of nestlings that flew from each nest (average) ..	2.34	2.81	2.54
Number of females that nested twice in a year in % ..	45.4	4.6	21.0

Food. The Spanish Sparrow is a granivorous bird with strongly marked morphological devices for eating plant seeds.

During the spring migration the birds have the possibility of gathering food in various places. But they prefer areas under wheat cultivation, fields of spring crops, unploughed stubble fields, old threshing-floors, outskirts of villages, and so on. The seeds of cultivated crops are the staple food of sparrows. But when for some reason it is difficult to procure this, it becomes only a small part of the bird's diet. In such cases the Spanish Sparrow principally eats the seeds of the most easily available wild plants, visiting fallow land, weed-patches, etc. in the quest.

After settling in the nesting colonies the birds prefer to glean grains of the last year's crop, if they can find them. Otherwise their food is made up largely of insects and the seeds of wild plants. If the sparrows are late in settling in their nest colonies (i.e. end of May or beginning of June), and find insufficient grain left over from last